



Sedimentation framework and tectonostratigraphic development

Case Study from Muglad Rift Basin, Sudan

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Muglad basin southwest of the Sudan is a major part of Sudan rift, which in turn, is a main component of West and Central Africa Rift-related System (WCARS) that started to develop during the late Jurassic-early Cretaceous time. This intra-continental rift system evolved through a three phased tectonic history spanning Berriasian to Cenomanian, Coniacian to Maastrichtian and Paleocene to Pliocene. Each cycle of these three mega rift cycles was followed by thermal contraction and sag phase.

Sedimentary sequences of the Muglad rift basin consists of non-marine cyclic sequences of lacustrine and fluvial/alluvial facies of early Cretaceous to late Tertiary age directly rested upon the Precambrian basement. Concentrating on the 1st rift cycle, this study overviews the sedimentation framework as a function of subsidence and thermal contraction. The data base is mainly from proprietary exploration work consist of 2D and 3D seismic data, well logs, core and FMI.

The first rift cycle was associated with the deposition of the Neocomian- Barremian Abu Gabra formation, while the sag phase was associated with the deposition of the Bentiu formation during the late Aptian-Cenomanian. Abu Gabra formation is a typical argillaceous facies dominated by cycles of lacustrine shale prograding to deltaic sands. This lacustrine shale provides good hydrocarbon source rock while the deltaic sand proved to be reservoir of good quality. This cyclicity could be due to the fact that rifting process was in pulses rather than a continuous subsidence. After the cessation of the rifting, thermal contraction had probably taken place and created accommodation which had been filled gradually and dominated by cycles of arenaceous fluvial deposits of Bentiu formation. Thus provide reservoir and seal facies. Seismic data,

logs and FMI have shown clear angular unconformity between Abu Gabra and Bentiu formations. This could be attributed to cessation of the rifting and sub aerial exposure of the basin.